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## New notes on the distribution of *Ensis directus* (Conrad, 1843) in Western Europe

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**Abstract:** Recently, an overview (Severijns, 2002) of the distribution of *Ensis directus* (Conrad, 1843) in Europe since its introduction near Hamburg in 1978 (von Cosel et al., 1982) till the year 2000 was given. The southernmost location where the species was found up to 2000 was Merville-Franceville-Plage, on the east bank of the mouth of the river Orne, near Caen (Fig. 1). In this paper new observations on the distribution of *E. directus* in France, which were carried out over the last three years, are presented and discussed. It follows that *E. directus* has now reached the region of St. Vaast-la-Hougue.

### New observations

Table 1 lists the observations that were carried out over the last three years. In October 2001 paired valves of *E. directus*, with a length of up to 148 mm, were found in Ouistreham, on the west bank of the mouth of the river Orne. From the growth lines it appeared that the largest shells were in their sixth year so that *E. directus* is present there since 1996. About six months later, in March 2002, up to 143 mm long paired valves were collected in the tidemark at Colleville-Montgomery-Plage, a few kilometres more west. These shells were up to 6 years old. Thus, as one would expect because of the proximity of Colleville-Montgomery-Plage and Ouistreham, *E. directus* arrived there at about the same time.

On August 16, 2002 one fresh, but unfortunately trampled down paired valve of *E. directus* (127 mm long) was found on Utah Beach, near the monument at la Madeleine. The growth lines on this shell indicated that *E. directus* arrived there in 1998 or even earlier. One year later, on August 18, 2003 *E. directus* was found to be rather common at this location: 16 paired valves were collected over a distance of only a few hundred metres. This was confirmed in September 2003 when F. Celen visited

the same beach. The length of the shells that were collected in August 2003 ranges from 123 mm up to 182 mm (the largest shell of *E. directus* that was reported in Western-Europe till now had a length of 187 mm (Vanhaelen, 1993)). The growth lines on the largest shells indicate that the species has occurred at Utah Beach since 1997, i.e. one year earlier than what was deduced from the single shell that was found there in August 2002.

Still on August 18, 2003 the beach of les Gougins (belonging to the town of St. Marcouf-les-Iles), about 12 km more west than la Madeleine, was visited as well. Five paired valves of *E. directus* were found there. One paired valve still contained the dead animal. Unfortunately all five shells were heavily damaged and none showed its full length. The largest shell had a width of 23 mm, from which one can estimate that it was most probably in its sixth year. This means that *E. directus* has probably been present at les Gougins since 1998. Still further, at the Pointe de Saire (just north of St. Vaast-la-Hougue) no shells of *E. directus* were found anymore, but only a few valves of *Ensis arcuatus* (Jeffreys, 1865). It can thus be concluded that, as far as we know, les Gougins is the farthest location in Europe that *E. directus* reached up to now in its distribution towards the south.

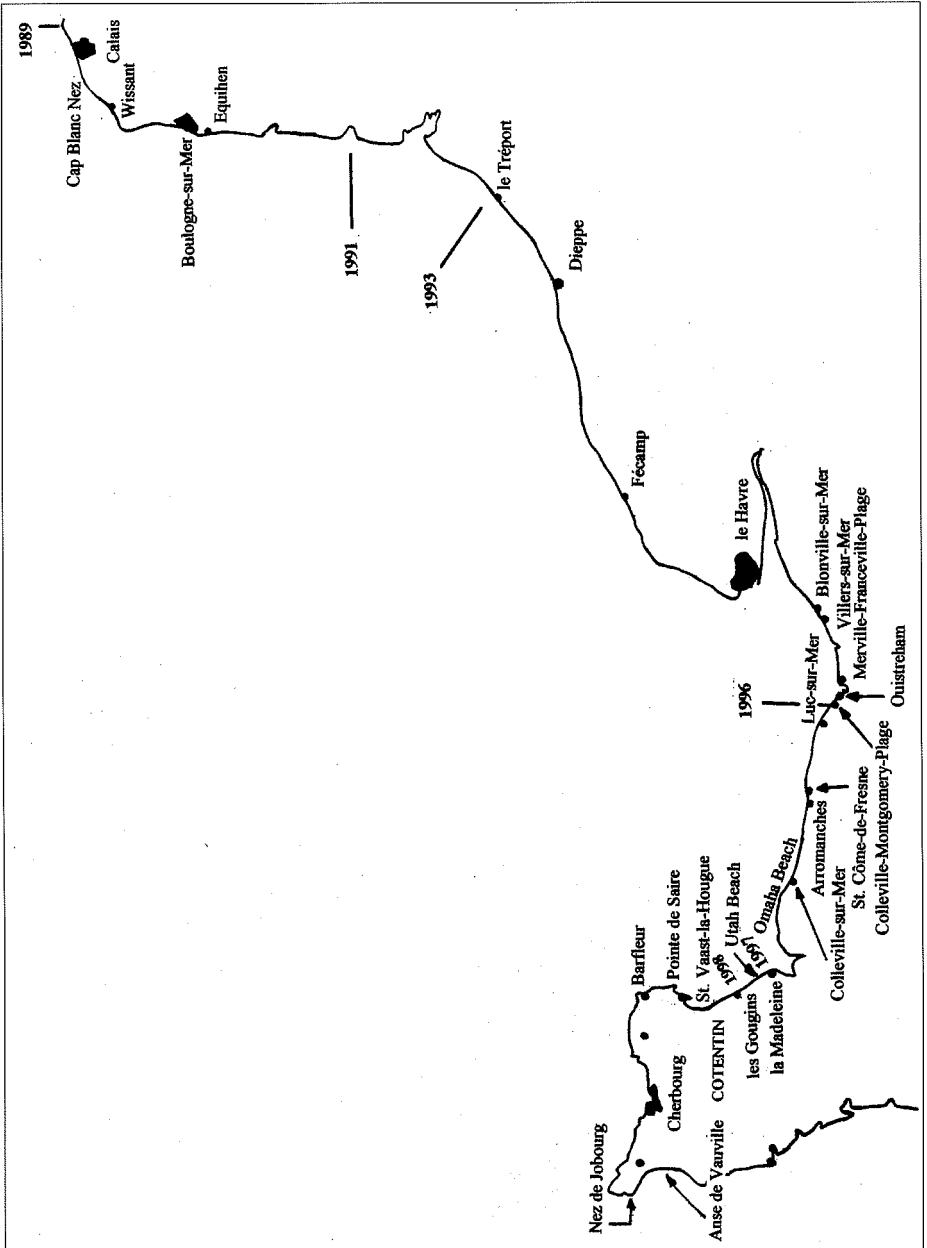


Figure 1. Distribution of *Ensis directus* in Western-Europe, south of Calais. The dates indicate when the species settled at a given location.

Several other interesting conclusions could be drawn from the observations. It was only on August 14, 2000 that shells of *E. directus* were found on the beach of Wissant, even though the species had already been found at Blériot-Plage (Calais) in 1992, just north of Wissant, and in July 1993 in Equihen, about 30 km more south. This is surprising since the vast and sandy bay of Wissant might provide a good habitat for this species. Moreover, at present Wissant is still the only location between the Cap Blanc Nez and Boulogne-sur-Mer where *E. directus* can be found.

At Luc-sur-Mer and St. Côme-de-Fresne no shells of *E. directus* were found as yet (cf. Table 1). As for Luc-sur-Mer this can of course be related to the rocky intertidal there. Also, when Luc-sur-Mer was visited on March 11, 2002 the nearby Colleville-Montgomery-Plage was the southernmost location where *E. directus* had been found till then, such that Luc-sur-Mer was at the borderline of the distributional area of *E. directus*. During the first visit to St. Côme-de-Fresne the southernmost location where *E. directus* had been found till then was Merville-Franceville-Plage, about 30 km east of St. Côme-de-Fresne, so that it need not be surprising that *E. directus* was not found there. However, only two days after the second negative result in St. Côme-de-Fresne, in August 2002, a first shell of *E. directus* was found on Utah Beach, near la Madelaine, which is about 45 km west of St. Côme-de-Fresne! Moreover, the vast and sandy bay of Arromanches near St. Côme-de-Fresne appears to be a suitable habitat for *E. directus*, and at both occasions shells of *Ensis arcuatus*, *Ensis ensis* (Linnaeus, 1758) and *Solen marginatus* Montagu, 1803 were found there. Whether *E. directus* lives in the bay of Arromanches or not is therefore an interesting subject for further investigation.

Finally, at several places the relative occurrence of *E. directus*, *E. arcuatus*, *E. ensis* and *S. marginatus* was investigated. The results listed in Table 2 show that these are about the same for Blonville-sur-Mer and Villers-sur-Mer. This is not surprising in view of the close proximity of these two locations. However, the population of *S. marginatus* appears to be larger in Blonville-sur-Mer. Further *E. ensis* also appears to be more abundant in Blonville-sur-Mer and Villers-sur-Mer, compared to Colleville-Montgomery-Plage. Finally, the two last columns indicate that *E. ensis* is even more abundant at Utah Beach (la Madelaine). It should be noted, however, that the extremely large number of shells of *E. ensis* observed at Utah Beach on August 18, 2003 (cf. last column) coincided with a large stranding (Severijns, 2003) which had cast ashore a significant amount of fresh and large shells of *E. ensis* (up to 137 mm long).

Date	Location	Remarks	Present since
18-08-00	<b>Wissant</b>	2 paired valves (damaged) in tidemark	
19-08-00	<b>Merville-Franceville-Plage</b>	paired valves, up to 168 mm	1996
18-08-01	Blonville-sur-Mer	common; most common ( <i>Ensis</i> -, <i>Solen</i> -) species	1996
24-08-01	St. Côme-de-Fresne	not found	-
Oct. '01	<b>Ouistreham</b>	paired valves; 99 - 148 mm (in 6 <sup>th</sup> year)	1996
11-03-02	Villers-sur-Mer	Common	1996
11-03-02	Luc-sur-Mer	not found	-
13-03-02	<b>Colleville-Montgomery-Plage</b>	paired valves, up to 143 mm (in 6 <sup>th</sup> year)	1996
13-03-02	Blonville-sur-Mer	Common	1996
14-08-02	St. Côme-de-Fresne	not found	-
16-08-02	<b>la Madeleine – Utah Beach</b>	1 paired valve, fresh, 127 mm (in 5 <sup>th</sup> year)	≤ 1998
18-08-03	la Madeleine - Utah Beach	16 paired valves, fresh, 123 to 182 mm (in 7 <sup>th</sup> year)	1997
18-08-03	<b>les Gougins (St.Marcouf)</b>	5 paired valves (damaged), 1 ex. with dead animal, width up to 23 mm (probably in 6 <sup>th</sup> year)	1998
22-08-03	Pointe de Saire	not found	-
23-08-03	<b>Colleville s/Mer - Omaha Beach</b>	1 paired valve, fresh, 158 mm (in 7 <sup>th</sup> year)	1997
Sept. '03	la Madeleine - Utah Beach	about 10 paired valves, fresh	

**Table 1.** Overview of observations performed in the period from August 2000 – August 2003 to investigate the spreading of *Ensis directus* along the French coast. The name of a location is printed in boldface if this is the first record of *E. directus* for that particular location. (the observation in Ouistreham was performed by L. Van Rillaar, the last observation at la Madeleine by F. Celen, and all other observations by the author).

Species	Blonville-sur-Mer 11/03/02	Villers-sur-Mer 11/03/02	Colleville- Montgomery- Plage 13/03/02	la Madeleine (Utah Beach)	
				16/08/02	18/08/03
<i>E. directus</i>	18	25	3	1 spec.	2
<i>E. arcuatus</i>	10	10	10	10	10
<i>E. ensis</i>	5	5	0.5 – 1	10	50
<i>S. marginatus</i>	15	5	4	10	20

**Table 2.** Relative numbers of *Ensis directus*, *Ensis arcuatus*, *Ensis ensis* and *Solen marginatus* observed in Blonville-sur-Mer, Villers-sur-Mer, Colleville-Montgomery-Plage and la Madeleine (Utah Beach). The numbers are relative to *E. arcuatus* which is rather common at all these locations.

## Conclusion

Observations carried out over the last three years along the Normandy coastline indicate that *E. directus* continues to extend its range further southward. In 1996 it had reached the region around the mouth of the river Orne, up to Colleville-Montgomery-Plage. Only one year later, in 1997, it had also reached Omaha Beach and Utah Beach (la Madeleine). It had thus spread all along the invasion beaches in just about one year (Fig. 1). This is the largest expansion of its area of distribution in one year's time since 1985 (see Fig. 3a in Severijns (2002))! In 1998 *E. directus* had moved further to the region of les Gougins, close to St. Vaast-la-Hougue. As far as known les Gougins is at present the farthest location in Europe that *E. directus* has reached in the southern part of its range.

As has become clear from previous interpretations of observations related to the distribution of *E. directus* in Europe (Severijns, 1999) one can only speculate about the future advance of this species towards the south. The next important challenge for this opportunist species, which has spread over several thousands of kilometres along the Western European coasts in about 25 years time, is to get round the northern part of the Cotentin region. The coastline of this part of the Cotentin, from St. Vaast-la-Hougue in the east up to the Anse de Vauville (near the Nez de Jobourg) in the west, mainly consists of rocky areas that are not very suited for *E. directus*. However, pre-

vously neither the rocky coastline between the Cap Blanc Nez and the Cap Griz Nez (between Calais and Boulogne-sur-Mer) nor the about 150 km long and high cliffs between le Tréport and le Havre could stop *E. directus* in its advance towards the south (Severijns & Gilles, 1993; Severijns, 1999). Therefore it can be expected that the species will manage to get round the tip of the Cotentin too. And once it will have succeeded it will probably only be a matter of time for it to reach Brittany. Indeed, the western coast of the Cotentin mainly consists of vast and sandy beaches, with estuaries at regular distances. This creates a muddy bottom that is the ideal habitat for *E. directus*. No doubt this study will be continued ...

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